INTERNATIONAL ACADEMY OF ASTRONAUTICS
Missions to the outer solar system and beyond
FIFTH IAA SYMPOSIUM ON REALISTIC NEAR-TERM ADVANCED SCIENTIFIC SPACE MISSIONS
Aosta, Italy, July 2-4, 2007

Explanation of dynamical Biefeld-Brown Effect from the standpoint of ZPF field

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Contents

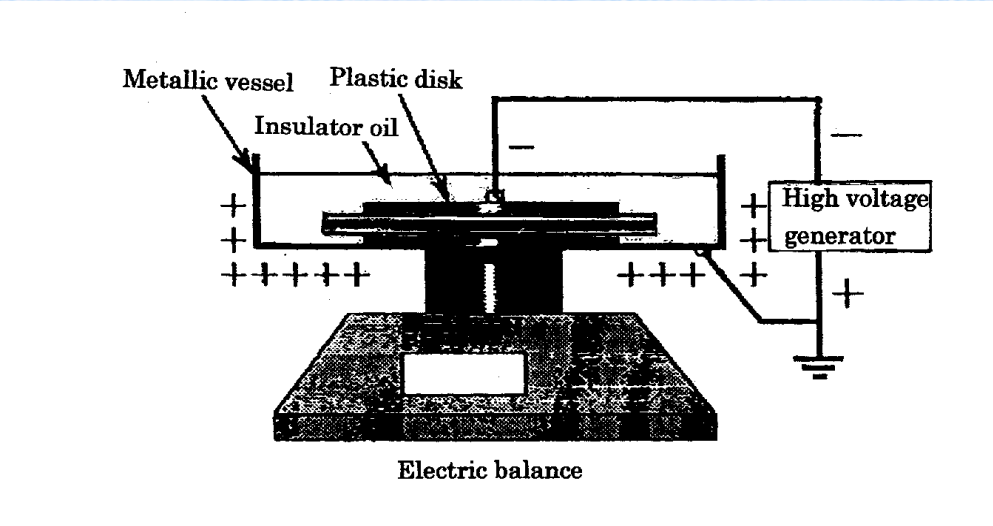
Purpose

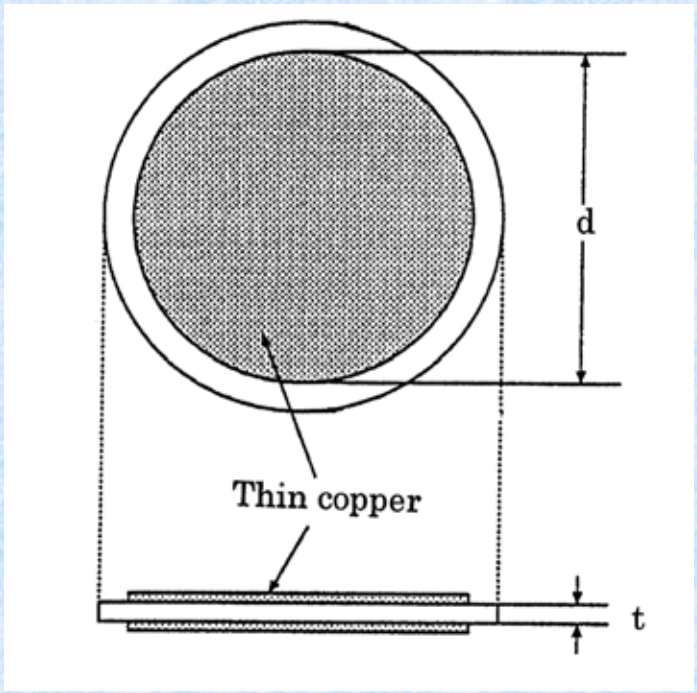
- To explain the weigh reduction at the experiment by applying alternate electric field to the capacitor conducted by the research group of the HONDA R&D Institute group from the standpoint of ZPF field in a space
- To investigate the applicability of the dynamical Biefeld-Brown effect for the propulsion system

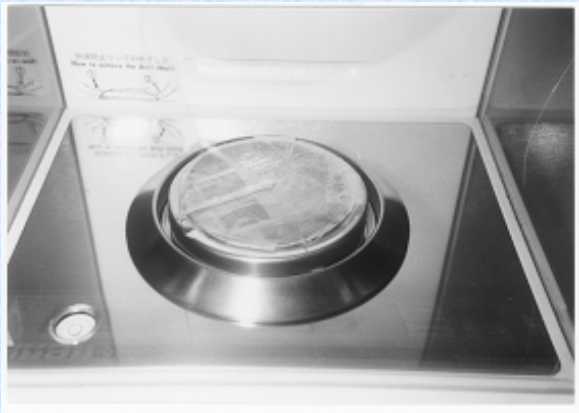
Outline of the dynamical B-B effect

- From the 1st of Feb. till the 1st of March in 1996, the research group of the HONDA R&D Institute conducted experiments to verify the B-B effect with an improved experimental device in 1996 to reject the influence of corona discharges and electric wind around the capacitor by setting the capacitor in the insulator oil contained within a metallic vessel. They found that the weight loss by the alternate electric field was greater than the static case .

Experimental set-up

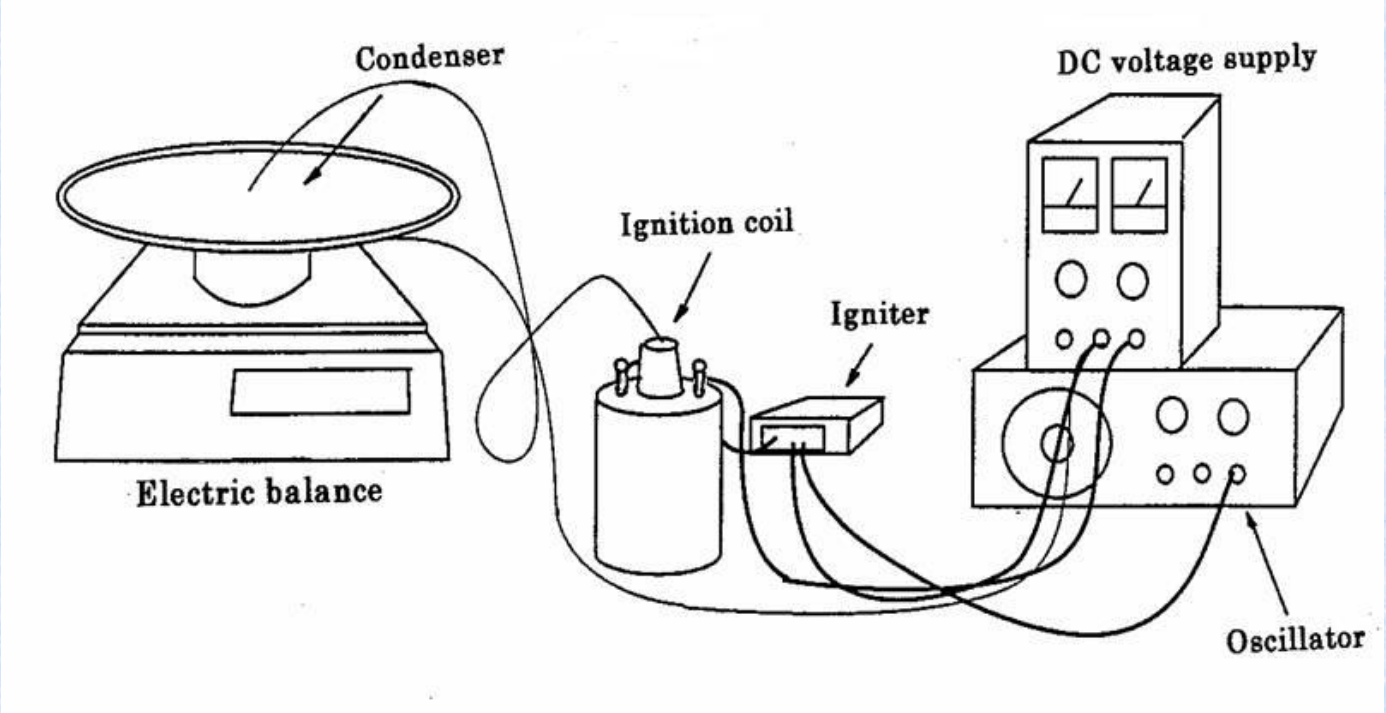




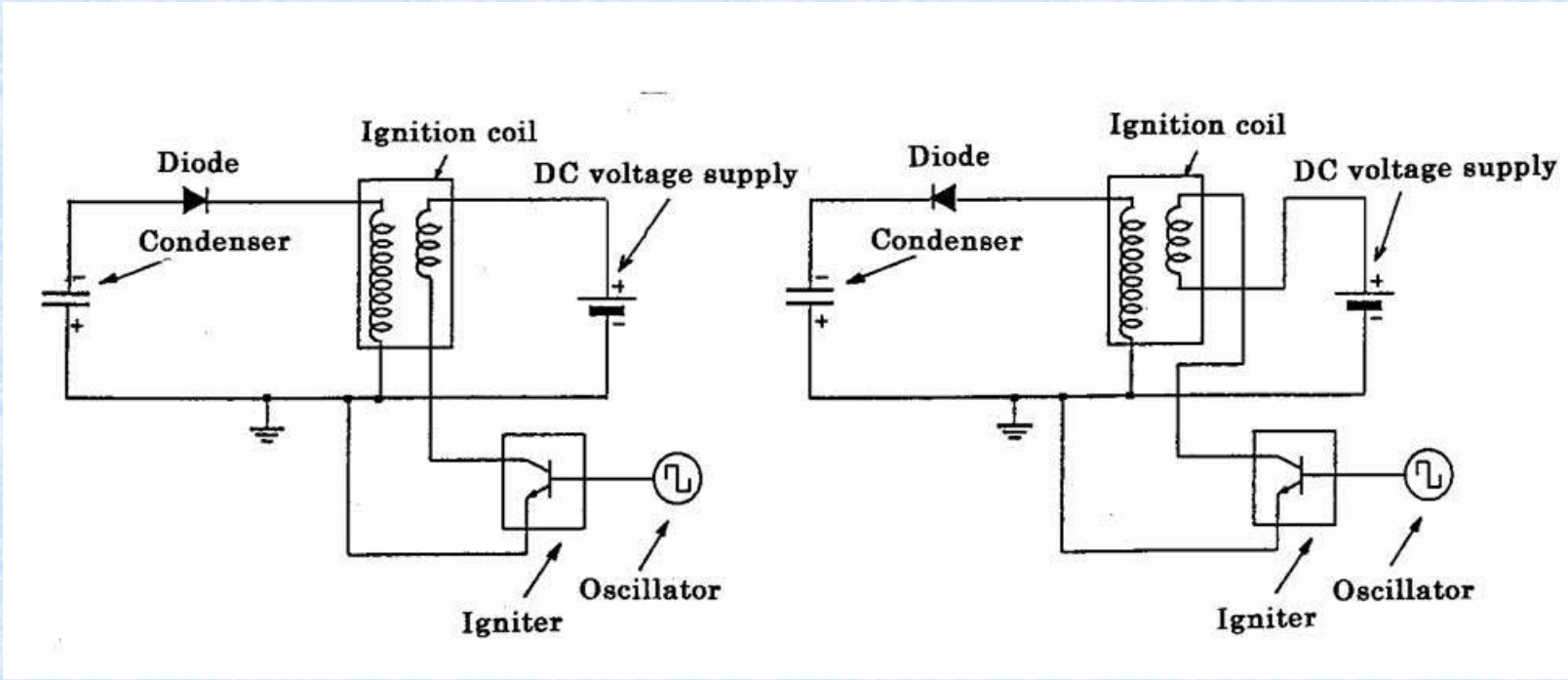


t=1mm,d=170mm,W=62g

Electrical circuit for generating HV electric field

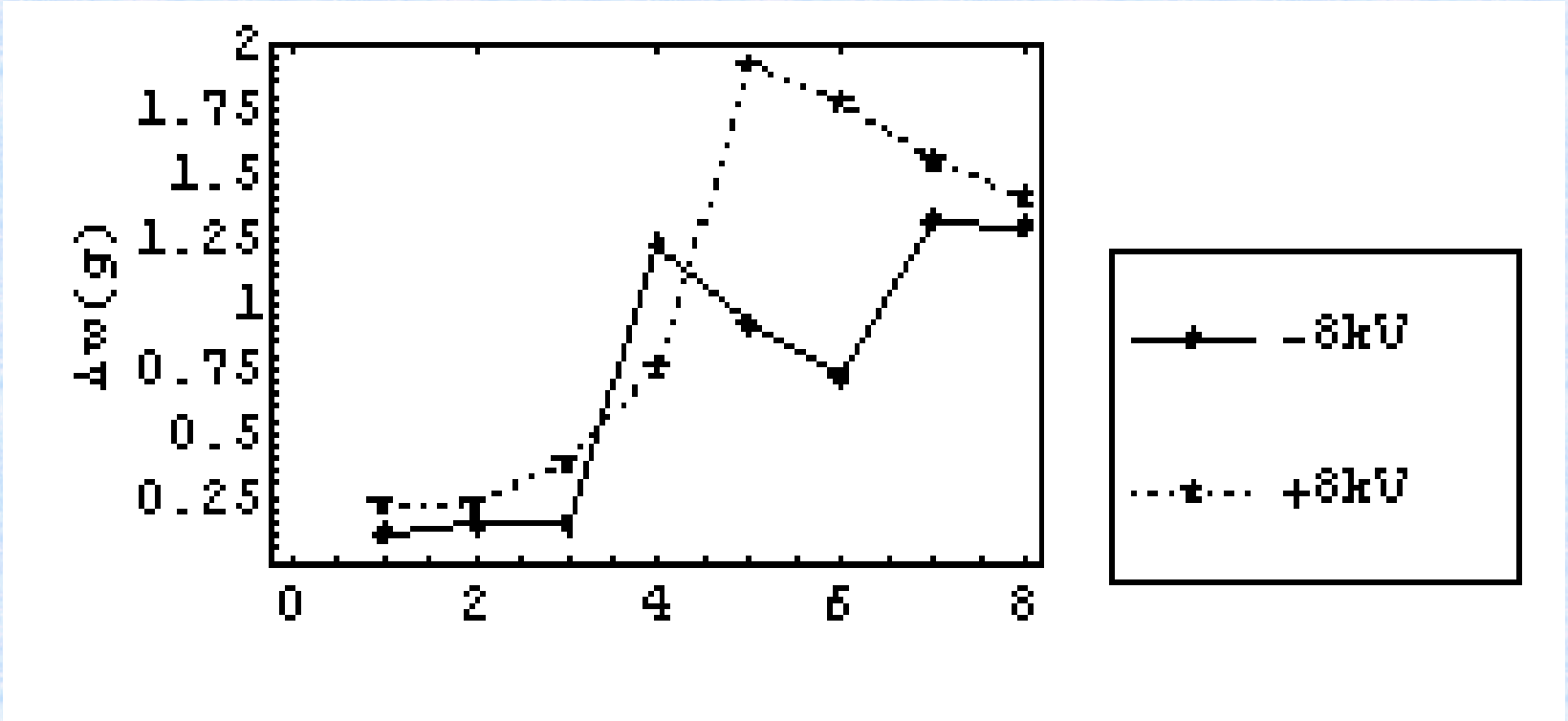


Schematic diagram of the electric circuit



8kV AC pulse, f=50Hz,

Histogram of weight losses observed at the experiment



$$\Delta M = 0.9 \pm 0.63\ g$$

Forces generated by the ionic transfer of the momentum

$$\Delta M = \sqrt{2 m_0 V_0 / q} \cdot (i / g_0)$$

T.B.Bahder & C.Fazi

By introducing experimental values, 1682pF, 8kV, and 50Hz, into the equation, the weight reduction due to ionic winds becomes 1.3×10^{-3}g , which is negligible small compared with the experimental result.

Gravitational field generated by the B-B effect

(Musha: weak field approximation of general relativity theory)

$$E_g \approx -Z\sqrt{4\pi\varepsilon_r\varepsilon_0 G}\cdot E = -8.62\times10^{-11} Z\sqrt{\varepsilon_r}\cdot E$$

(Ivanov: Weyl-Majumdar-Papapetrou solutions of the general Relativity theory)

$$F_g = \sqrt{G\varepsilon}\frac{M}{d}\overline{\psi}_2 = \sqrt{G\varepsilon}\mu S\overline{\psi}_2$$

$$\Delta M = 8.62\times10^{-11} Z\sqrt{\varepsilon_r} EW / g_0 = 0.002(g)$$

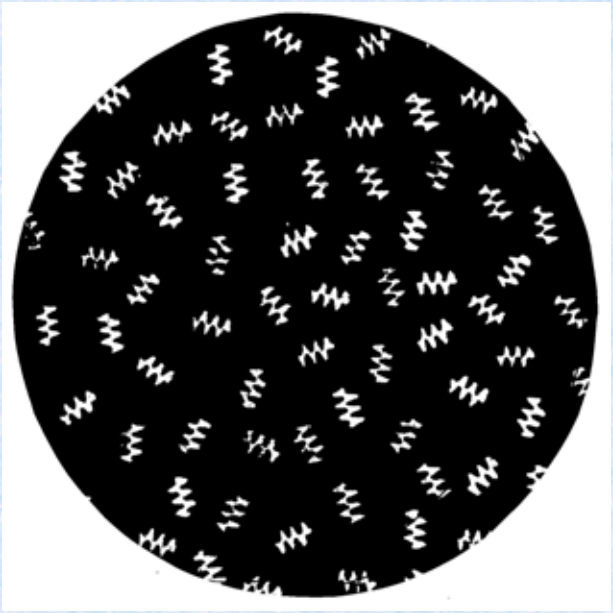
(Experiment) $\Delta M = 0.9 \pm 0.63\ g$

Possibility of artificial gravity induced by dynamical electromagnetic field

Inertial mass generated by the ZPF field

$$m = \frac{\Gamma \hbar \omega_c^2}{2\pi\, c^2}$$

Inertial mass is originated to the interaction of sub-elementary particles with the vacuum ZPF field



ZPF field in a space

$$\rho(\omega)d\omega = \frac{\hbar\omega^3}{2\pi^2 c^3} d\omega$$

（M.B.King : Tapping the zero-point energy）

A slight coherence of vacuum fluctuations due to the high potential electric field caused an alternation of inertial properties of the body with the ionic lattice of a rapidly spinning atom .

（B.Haish, A.Rueda and H.E.Puthoff ）

If one could somehow modify the vacuum medium then the mass of a particle or object in it would change according to the zero-point field theory.

Process to derive the anti-gravity equation

(A) Electrodynamic Hamiltonian by P.Milonni

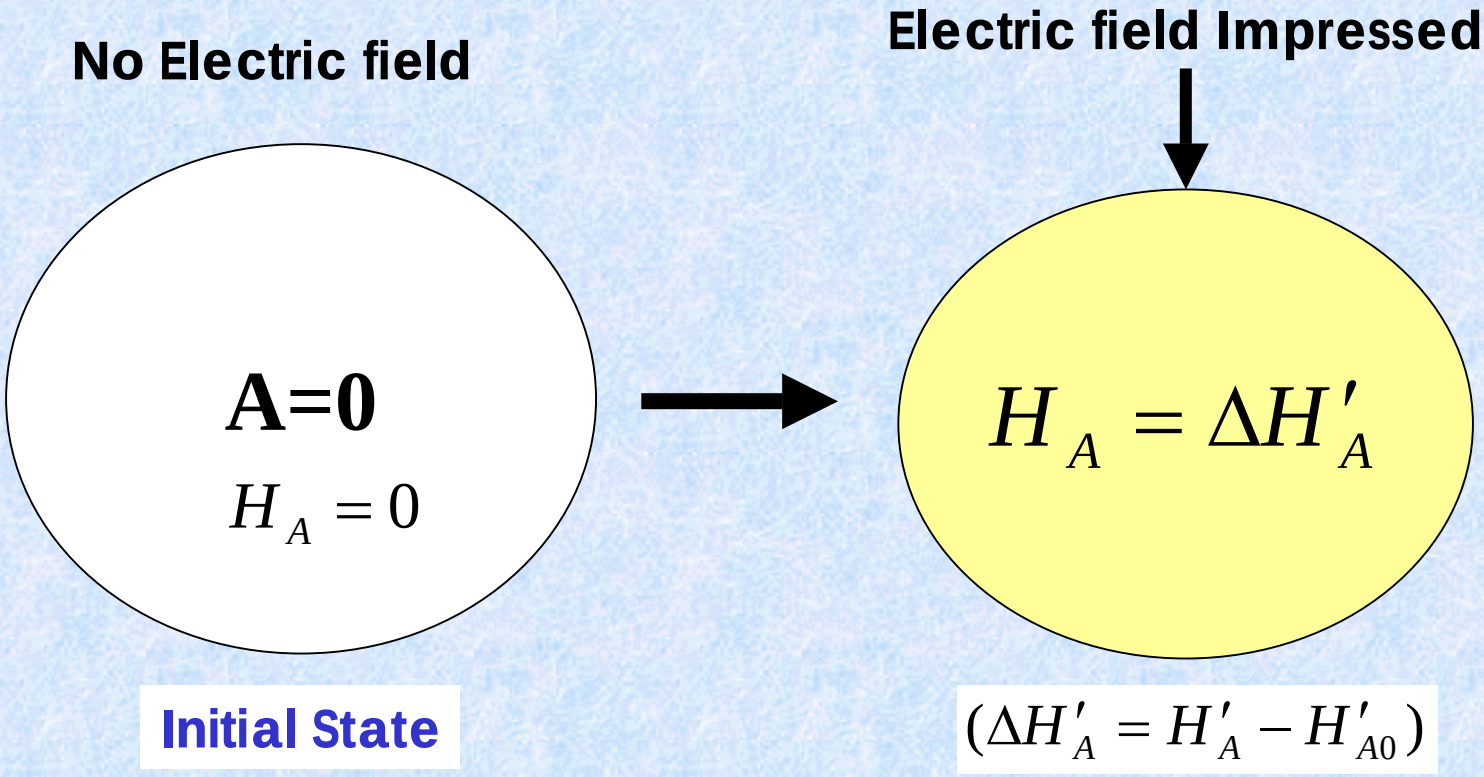
$$H_A = \frac{e^2}{2m_0c^2} < A^2 >$$

(B) Electromagnetic Hamiltonian corresponding Zero-point fields (B.Haisch, A.Rueda, H.E.Puthoff)

$$H'_A = \frac{e^2\hbar}{2\pi m_0 c^3}\omega_c^2$$

Assumption to derive equation

$$\Delta(H_A - H'_A) = 0$$



Equation of Mass Shift

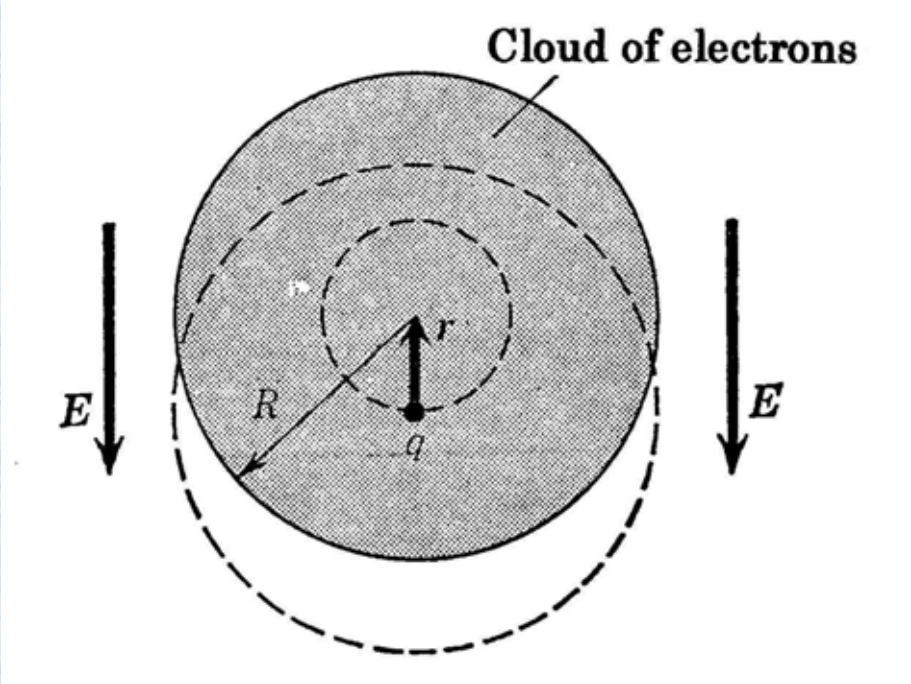
Electrodynamic Hamiltonian

$$H_A = \Delta H'_A$$

$$\Delta\omega = -\frac{\pi c}{2\hbar\omega_0} < A^2 > \quad \leftarrow \quad m = \frac{\Gamma\hbar\omega_c^2}{2\pi\, c^2}$$

$$\Delta m / m = -2\Delta\omega / \omega_0 = \frac{\pi c}{\hbar\omega_0^2} < A^2 >$$

A-field generated by the movement of electrons



$$A = \frac{1}{4\pi\varepsilon_0 c^2}\frac{\dot{p}(t - r/c)}{r} = \frac{1}{4\pi\varepsilon_0 c^2}\frac{\omega N e d(t)}{r}$$

$$d(t) = \frac{Ne}{m}\frac{E_0}{\omega_e^2 - \omega^2}\cos\omega(t - r/c)$$

Mass reduction by the impressed electric field

$$\Delta M(\omega)/M = \frac{\pi G}{c^4}\int < A^2 > dv = -\frac{N^2 e^4 G R}{4\varepsilon_0^2 m^2 c^8}\frac{\omega^2}{(\omega_e^2-\omega^2)^2+\eta^2\omega^4}E_0^2$$

$$\int_{\omega_1}^{\omega_2}\frac{\omega^2 d\omega}{(\omega_e^2-\omega^2)^2+\eta^2\omega^4} \approx \frac{\pi}{2\eta\omega_e}$$

$$\Delta M/M = -\frac{\pi}{8}\frac{e^4 G}{\varepsilon_0^2 m^2 c^8}\frac{N^2 R}{\eta\omega_e}E_0^2$$

$$\omega_e = \sqrt{Ze^2/\alpha_e m}$$

Compared result with the Honda experiment

$$\eta = \Gamma = 2e^2 / 3mc^2$$

(Abraham-Lorenz damping constant)

$$\Delta M / M = -3.23 \times 10^{-13} R \frac{V^2}{t^2}$$

$$V = 8kV,\ t = 1mm,\ R = 1mm$$

$$N = 10^{24},\ \omega_e = 6 \times 10^{13}$$ **(dense hot plasma)**

$$\Delta M = 1.28g$$

$$\Delta M = 0.9 \pm 0.63g$$ (Experiment)

Mechanism of the Dynamical B-B effect

Alternate external A-field

↓

ZPF cutoff frequency shifted

↓

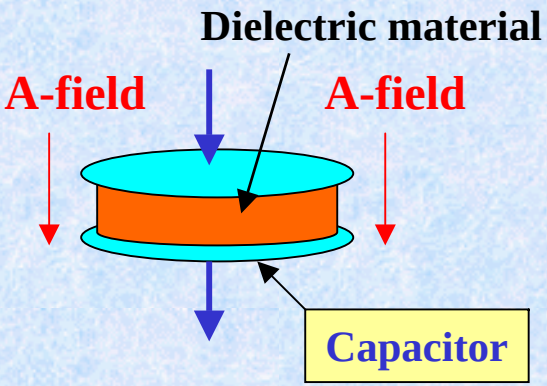
Mass shift of the dielectric material

↓

Coupled with external forces

↓

Net force generated



Acceleration of the moving body induced by the electric field

$$\Delta M / M = -3.23\times10^{-13} R \frac{V^2}{t^2}$$

$$F = \frac{d(Mv)}{dt} = v\frac{dM}{dt} + M\alpha$$

Conservation of momentum

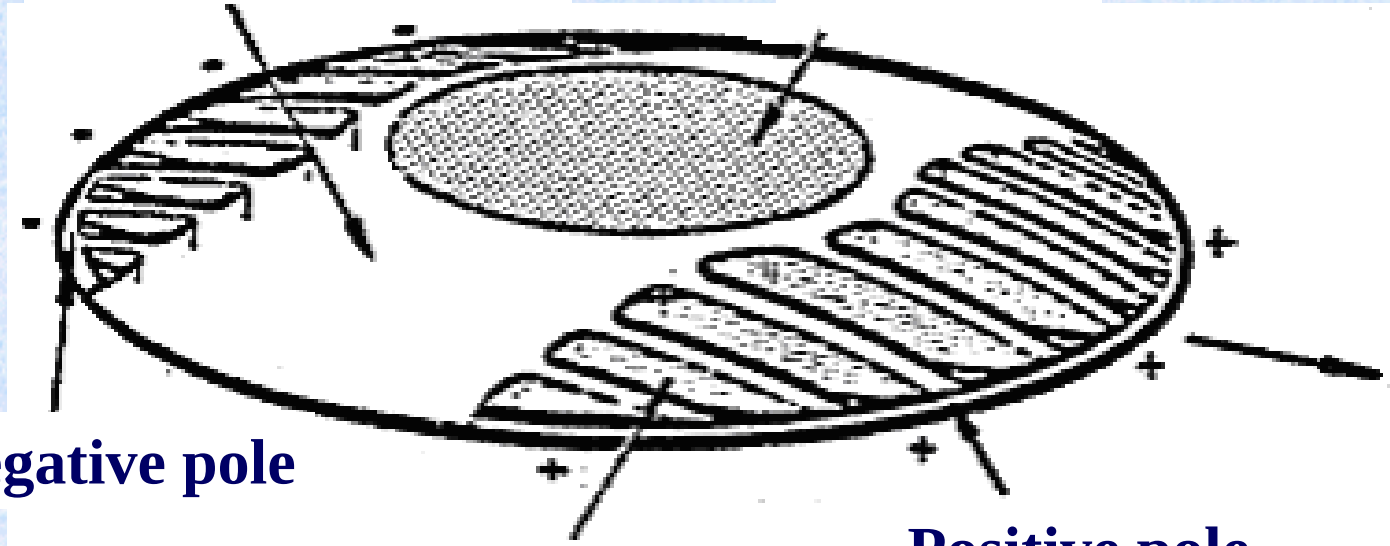
$$\alpha = -\frac{v}{\Delta t}\frac{\Delta M}{M} = 3.23\times10^{-13}\frac{Rv}{\Delta t}\frac{V^2}{t^2}$$

Factors to induce a weight loss of the capacitor

- Increase the AC voltage impressed to the capacitor, nonlinear increase of the weight loss is produced.
- Increase the charge density of electric current flowing through the capacitor, the greater the weight loss

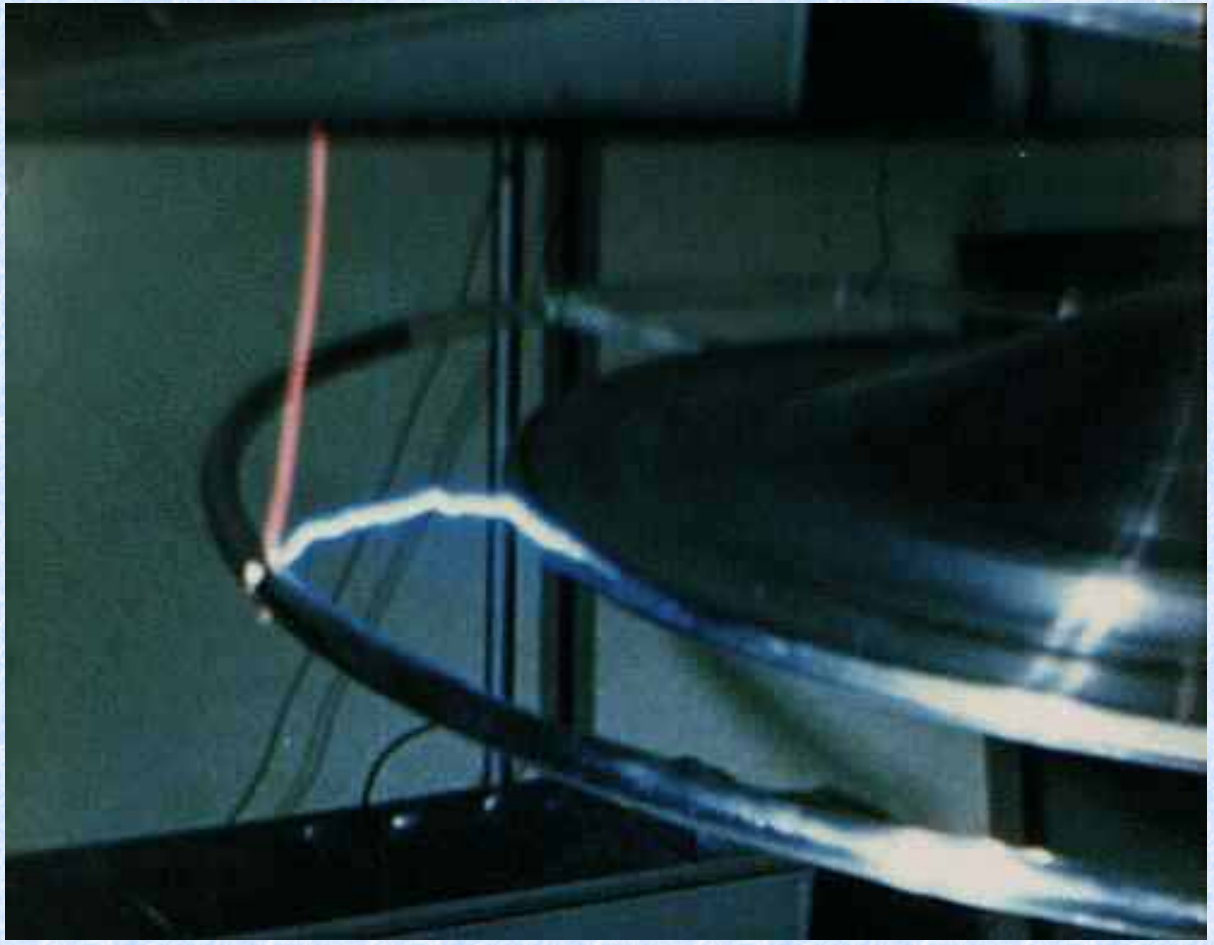
Electrogravitic propulsion systems

Electrogravitic craft by Brown



(Brown disc airfoil)

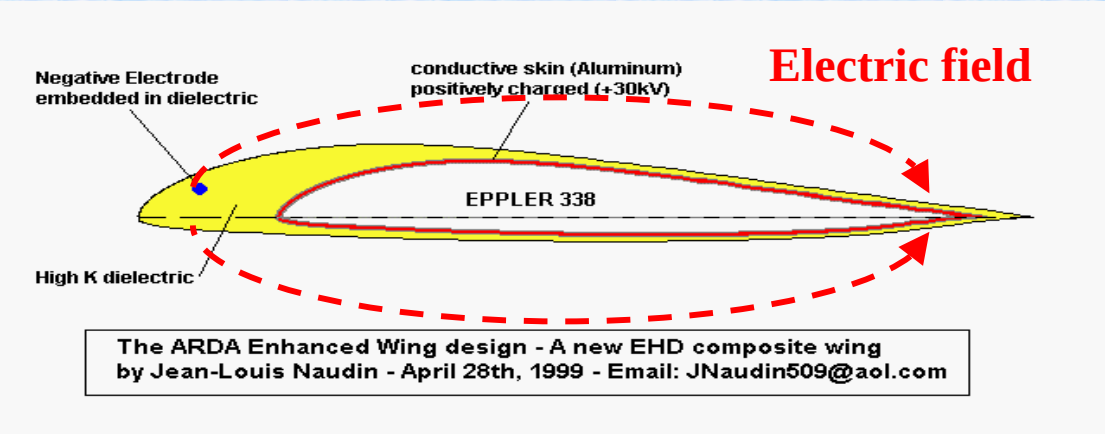
Spark generated at the Brown's experiment

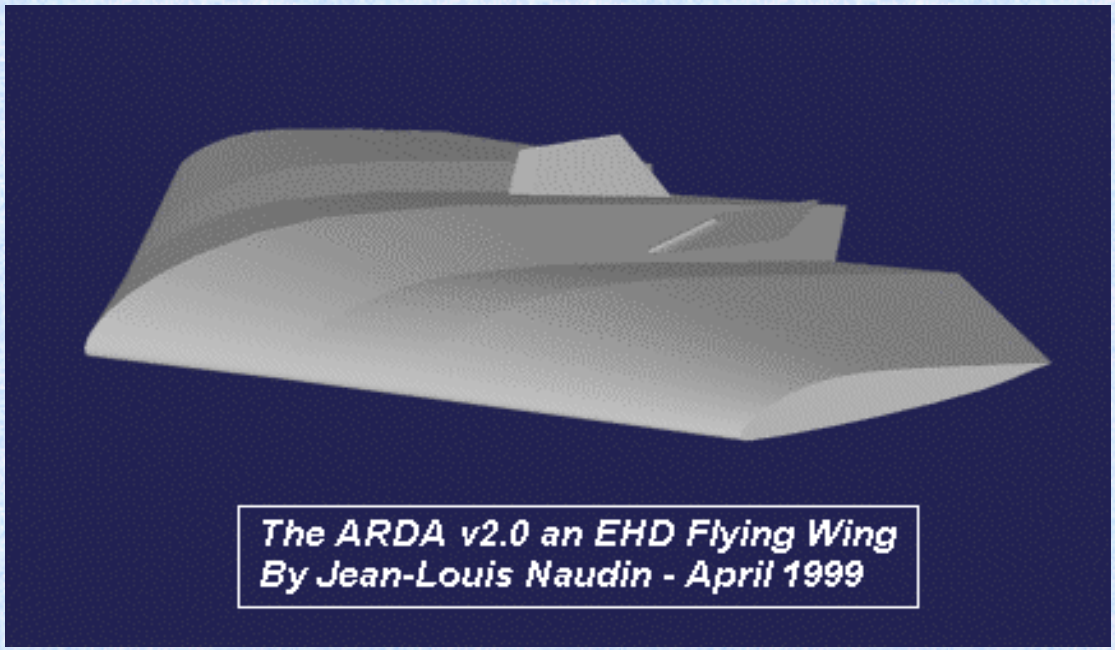


Brown's experimental results

- A large thrust was associated with spark. A residual thrust existed without sparking (1956)
- A DC voltage caused a thrust when initially applied. The thrust would decay within 60 seconds. (1928)
- The thrust varies with the time of day(Both in vacuum and oil)

Electrogravitic craft (ARDA) by the JLN Labs



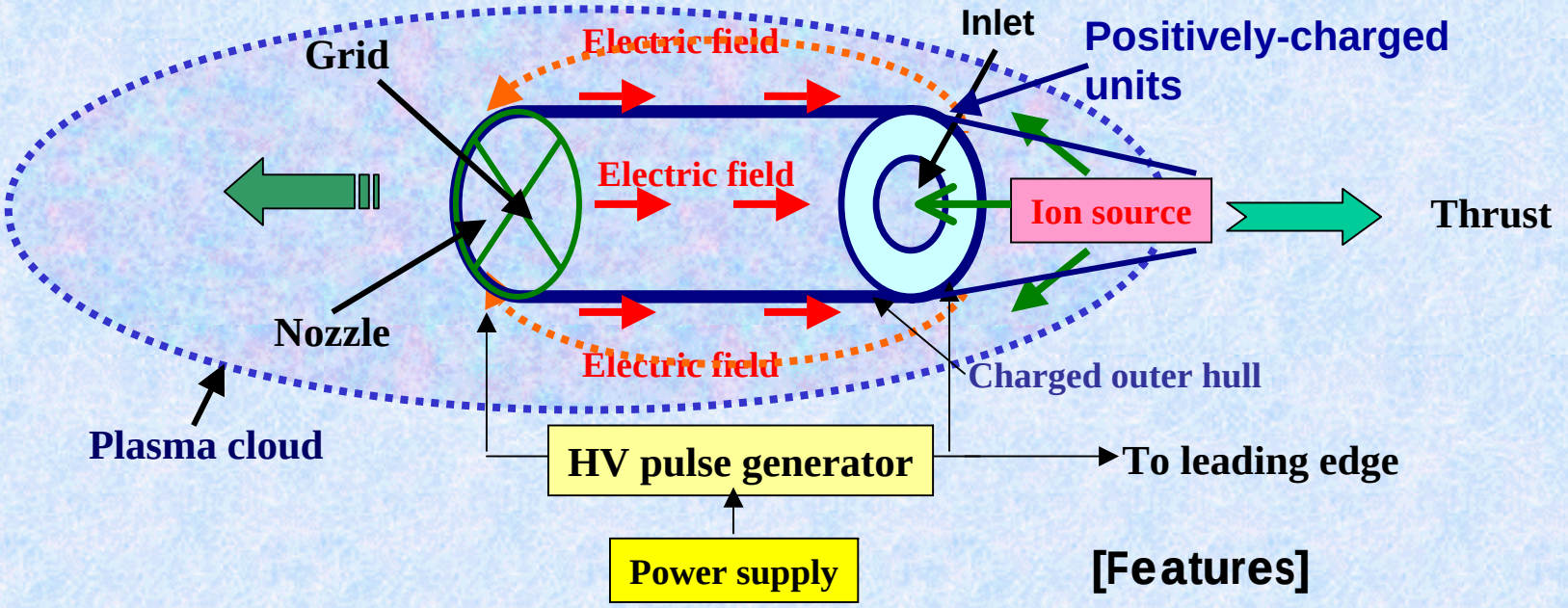


Electrogravitic propulsion system

(Concept of the pulsed electric field plasma propulsion)

$$\alpha = \frac{\pi}{8}\frac{e^4 G}{\varepsilon_0^2 m^2 c^8}\frac{N^2 R}{\eta \omega_e}\frac{\nu}{\Delta\tau}E_0^2$$

R: Radius of plasma cloud
N: Plasma density
E_0:Electric field



[Features]

- Highly acceleration capability
- Low consumption of fuel

Conclusion

- **From the theoretical analysis by the zero-point field theory, it is considered that the origin of the dynamical Biefeld-Brown effect might be attributed to the interaction of zero-point vacuum fluctuations with high potential electric field impressed to the capacitor. This result suggests that the pulsed electric field applied to the capacitor may produce artificial gravity sufficient for practical application to the space propulsion technology.**

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The End

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